

Additional file 1: Equipment and materials used (Manufacturer's names and addresses)

- Commercially available common environmental inhalants from Allergopharma® GmbH & Co KG (Reinbeck, Germany), Bencard® Allergie GmbH (Munich, Germany), and Laboratoris Leti® (Barcelona, Spain).
- Ammonium persulfate $\geq 98\%$ from Sigma-Aldrich® (Saint Louis, MO, USA).
- Aqua dest. 10 ml (Aqua mini-plasco® connect) from B. Braun Melsungen AG (Melsungen, Germany).
- Lung function testing with bodyplethysmography und unspecific inhalation test was performed with the MasterScreen Body/Diff ®Jäger from Vyair medical (Hoechberg, Germany).
- For the metacholine challenge the aerosolized particles were generated by the APS pro Nebulizer Head ®Jäger from CareFusion/Vyair medical (Hoechberg, Germany) and provocation was performed with the reservoir method PARI Provocation Test® II (PARI GmbH, Starnberg, Germany). For this a 3.2% metacholine solution prepared by the hospital pharmacy of the university hospital Erlangen-Nürnberg was used.
- Statistical analyses were conducted with IBM® SPSS® Statistics (Version 25) (Armonk, NY, United States) and OriginLab Origin® (Northampton, Massachussets, United States).